

A LIST OF THE ROTATORIA OF WASHINGTON AND VICINITY, WITH DESCRIPTIONS OF A NEW GENUS AND TEN NEW SPECIES.

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INTRODUCTION.

The investigation of the Rotatorian fauna of this region was begun about five years ago, and has revealed an entirely unsuspected wealth of rare and undescribed species. In the appended list are recorded 236 previously described species. As far as practicable preserved material of these has been deposited in the National Museum, so that their identity may be verified. A large number of new species have been found; of these 10 are here described and figured.

It should not be inferred that Washington affords unusual opportunities for collecting Rotatoria, or that any vast territory has been overrun; nearly the entire list is based on collections made in the old Fish Ponds, now filled in, the ponds at Kenilworth, District of Columbia, and Lakeland, Maryland, swamps and ponds at Four-Mile Run, Virginia, and occasional trips to Black Pond, Virginia, and Glenburnie, Maryland. But little work has so far been done on the Potomac River.

For the determination of most of the Bdelloids I am indebted to Mr. David Bryce, of London, England, who has at all times placed his unsurpassed knowledge of this group at my disposal.

For the illustrations an arbitrary sliding scale has been used; for an animal measuring 100  $\mu$  a size of 50 mm. was selected and for each succeeding 100  $\mu$  10 mm. added, so that the size of the illustration is 40 mm. + 10 mm. for each 100  $\mu$  of the total length. While no doubt objections may be urged against this arrangement, it has the advantage of keeping figures of the largest Rotatoria within the limits of an octavo page, while the smallest are sufficiently large to show the necessary detail. For the trophi a base size of 25 mm. for an actual 10  $\mu$  has been used, adding 2.5 mm. for each succeeding 10  $\mu$ ; the size of the illustration thus becomes 22.5 mm. + 2.5 mm. for each 10  $\mu$  of the length.

## LIST OF ROTATORIA FOUND IN THE DISTRICT OF COLUMBIA, MARYLAND, AND VIRGINIA.

## Order PLOIMA.

- Notommata aurita* (Müller).  
*Notommata brachyota* Ehrenberg.  
*Notommata caudata* Collins.  
*Notommata cerberus* (Gosse).  
*Notommata contorta* (Stokes)=*Diglena contorta* Stokes.  
*Notommata copeus* Ehrenberg.  
*Notommata cyrtopus* Gosse.  
*Notommata melandocus* (Gosse)=*Furcularia melandocus* Gosse.  
*Notommata najas* Ehrenberg.  
*Notommata pachyura* (Gosse)=*Copeus pachyurus* Gosse=*Copus triangulatus* Kirkman.  
*Notommata pseudocerberus* de Beauchamp.  
*Notommata saccigera* Ehrenberg.  
*Notommata silpha* (Gosse)=*Notommata forcipata* of Gosse, not Ehrenberg,=*Diglena silpha* Gosse.  
*Notommata torulosa* (Dujardin).  
*Notommata tripus* Ehrenberg.  
*Taphrocampa annulosa* Gosse.  
*Taphrocampa clavigera* Stokes.  
*Taphrocampa selenura* Gosse.  
*Proales decipiens* (Ehrenberg).  
*Pleurotrocha petromyzon* (Ehrenberg).  
 ?*Pleurotrocha sordida* (Gosse)=*Proales sordida* Gosse.  
*Eosphora elongata* Ehrenberg.  
*Cephalodella catellina* (Müller)=*Diglena catellina* (Müller).  
*Cephalodella forcifcula* (Ehrenberg)=*Furcularia forcifcula* Ehrenberg.  
*Diaschiza auriculata* (Müller)=*Diaschiza lacinulata* (Müller).  
*Diaschiza eva* (Gosse).  
*Diaschiza exigua* Gosse.  
*Diaschiza forcifcata* (Ehrenberg)=*Diaschiza cæca* (Gosse).  
*Diaschiza gibba* (Ehrenberg).  
*Diaschiza globata* Gosse.  
*Diaschiza gracilis* (Ehrenberg).  
*Diaschiza megaloccephala* (Glasscott).  
*Diaschiza sterea* (Gosse).  
*Diaschiza tenuior* Gosse.  
*Rousseletia corniculata*, new species.  
*Monommata orbis* (Müller)=*Furcularia longiseta* (Müller).  
*Dicranophorus auritus* (Ehrenberg)=*Eosphora aurita* (Ehrenberg).  
*Dicranophorus forcipatus* (Müller)=*Diglena forcipata* (Müller).  
 ?*Dicranophorus grandis* (Ehrenberg)=*Diglena grandis* Ehrenberg.  
*Encentrum aper*, new species.  
*Encentrum myriophylli*, new species.  
*Encentrum ricciae*, new species.  
*Diglena caudata* Ehrenberg=*Diglena biraphis* Gosse.  
*Diglena clastopis* Gosse.  
*Diglena permollis* Gosse.  
*Proales felis* (Müller).  
*Taphrocampa saundersiæ* Hudson.  
*Theorus uncinatus* Ehrenberg.

- Epiphanes brachionus* (Ehrenberg)=*Notops brachionus* (Ehrenberg).  
*Epiphanes clavulata* (Ehrenberg)=*Notops clavulatus* (Ehrenberg).  
*Epiphanes senta* (Müller)=*Hydatina senta* (Müller).  
*Cyrtonia tuba* (Ehrenberg).  
*Proalides tentaculatus* de Beauchamp.  
*Microcodon clavus* Ehrenberg.  
*Mikrocodides chlæna* (Gosse).  
*Brachionus angularis* Gosse.  
*Brachionus budapestinensis* Daday.  
*Brachionus calyciflorus* Pallas=*Brachionus pala* Ehrenberg.  
*Brachionus capsuliflorus* Pallas=*Brachionus bakeri* Müller=*Brachionus urceolaris* Müller.  
*Brachionus havanaensis* Rousselet.  
*Brachionus patulus* Müller=*Brachionus militaris* Ehrenberg.  
*Brachionus plicatilis* Müller=*Brachionus mülleri* Ehrenberg.  
*Platylas quadricornis* (Ehrenberg)=*Noteus quadricornis* Ehrenberg.  
*Keratella cochlearis* (Gosse)=*Anuræa cochlearis* Gosse.  
*Keratella quadrata* (Müller)=*Anuræa aculeata* Ehrenberg.  
*Keratella serrulata* (Ehrenberg)=*Anuræa serrulata* Ehrenberg.  
*Keratella stipitata* (Ehrenberg)=*Anuræa stipitata* Ehrenberg.  
*Notholca bostoniensis* Rousselet.  
*Notholca striata* (Müller).  
*Anuræopsis fissa* (Gosse)=*Anuræa hypelasma* Gosse.  
*Mytilina compressa* (Gosse)=*Diplax compressa* Gosse.  
*Mytilina trigona* (Gosse)=*Diplax trigona* Gosse.  
*Mytilina ventralis* (Ehrenberg)=*Salpina ventralis* Ehrenberg.  
*Euchlanis deflexa* Gosse.  
*Euchlanis dilatata* Ehrenberg.  
*Euchlanis oropha* Gosse.  
*Euchlanis pyriformis* Gosse.  
*Dipleuchlanis propatula* (Gosse).  
 ?*Lecane affinis* (Levander)=*Cathypna affinis* Levander.  
 ?*Lecane flexilis* (Gosse)=*Distyla flexilis* Gosse.  
*Lecane hornemanni* (Ehrenberg)=*Distyla hornemanni* (Ehrenberg).  
*Lecane leontina* (Turner)=*Cathypna leontina* Turner.  
*Lecane ludwigii* (Eckstein)=*Distyla ludwigii* Eckstein.  
*Lecane luna* (Müller)=*Cathypna luna* (Müller).  
*Lecane ohioensis* (Herrick)=*Distyla ohioensis* Herrick.  
*Lecane signifera* (Jennings)=*Distyla signifera* Jennings.  
*Lecane spinifera* (Western)=*Distyla spinifera* Western.  
*Lecane stichæa*, new species.  
*Lecane stokesii* (Pell)=*Distyla stokesii* (Pell).  
*Lecane unguolata* (Gosse)=*Cathypna unguolata* Gosse.  
*Monostyla acus*, new species.  
*Monostyla arcuata* Bryce.  
*Monostyla bifurca* Bryce.  
*Monostyla bulla* Gosse.  
 ?*Monostyla closterocerca* Schmarda.  
*Monostyla cornuta* (Müller).  
*Monostyla crenata*, new species.  
*Monostyla furcata* Murray.  
*Monostyla galeata* Bryce.  
*Monostyla hamata* Stokes.  
*Monostyla lunaris* Ehrenberg.

- Monostyla monostyla* (Daday) = *Diarthra monostyla* Daday.  
*Monostyla quadridentata* Ehrenberg.  
*Monostyla sylvatica*, new species.  
*Lepadella acuminata* (Ehrenberg) = *Metopidia acuminata* Ehrenberg.  
*Lepadella cristata* (Rousselet) = *Colurus cristatus* Rousselet.  
*Lepadella oblonga* (Ehrenberg) = *Metopidia oblonga* Ehrenberg.  
*Lepadella ovalis* (Müller) = *Metopidia solidus* Gosse.  
*Lepadella patella* (Müller) = *Metopidia emarginata* (Ehrenberg).  
*Lepadella quinquecostata* (Lucks) = *Metopidia quinquecostata* Lucks.  
*Lepadella salpina* Ehrenberg.  
*Lepadella triptera* Ehrenberg.  
*Colurella bicuspidata* (Ehrenberg).  
 ?*Colurella colurus* (Ehrenberg) = *Colurus amblytelus* Gosse.  
*Colurella obtusa* (Gosse).  
*Colurella sulcata* (Stenroos) = *Metopidia sulcata* Stenroos.  
*Squatinella bifurca* (Hudson) = *Stephanops bifurcus* Hudson.  
*Squatinella longispinata* (Tatem) = *Stephanops longispinatus* Tatem.  
*Squatinella mutica* (Ehrenberg) = *Stephanops muticus* Ehrenberg.  
*Squatinella tenella* (Bryce) = *Stephanops tenellus* Bryce.  
*Trichotria brevidactyla*, new species.  
*Trichotria pocillum* (Müller) = *Dinocharis pocillum* (Müller).  
*Trichotria similis* (Stenroos) = *Dinocharis similis* Stenroos.  
*Trichotria tetractis* (Ehrenberg) = *Dinocharis tetractis* Ehrenberg.  
*Macrochætus collinsii* (Gosse) = *Dinocharis collinsii* Gosse.  
*Macrochætus subquadratus* Perty = *Polychætus subquadratus* (Perty).  
*Scaridium eudactylosum* Gosse.  
*Scaridium longicaudum* (Müller).  
*Trichocerca bicristata* (Gosse) = *Rattulus bicristatus* (Gosse).  
*Trichocerca bicuspes* (Pell) = *Rattulus bicuspes* (Pell).  
*Trichocerca cylindrica* (Imhof) = *Rattulus cylindricus* (Imhof).  
*Trichocerca elongata* (Gosse) = *Rattulus elongatus* (Gosse).  
*Trichocerca flava* (Voronkov) = *Rattulus flavus* Voronkov.  
*Trichocerca iernis* (Gosse) = *Rattulus gracilis* (Tessin).  
*Trichocerca longiseta* (Schrank) = *Rattulus longiseta* (Schrank).  
*Trichocerca lophæssa* (Gosse) = *Rattulus lophæssus* (Gosse).  
*Trichocerca multicrinis* (Kellicott) = *Rattulus multicrinis* (Kellicott).  
*Trichocerca rattus* (Müller) = *Rattulus rattus* (Müller).  
*Diurella brachyura* (Gosse).  
*Diurella cavia* (Gosse).  
*Diurella dixon-nuttalli* Jennings.  
*Diurella insignis* Herrick.  
*Diurella porcellus* (Gosse).  
*Diurella rousseleti* (Voigt).  
*Diurella stylata* Eyferth.  
*Diurella sulcata* (Jennings).  
*Diurella tenuior* (Gosse).  
*Diurella tigris* (Müller).  
*Diurella weberi* Jennings.  
*Elosa worrallii* Lord.  
*Chromogaster ovalis* (Bergendal) = *Anapus ovalis* Bergendal.  
*Gastropus hyptopus* (Ehrenberg).  
*Gastropus minor* (Rousselet).  
*Gastropus stylifer* Imhof.  
*Ascomorpha ecaudis* Perty.

- Ascomorpha saltans* Bartsch.  
*Synchæta bicornis* Smith.  
*Synchæta cecilia* Rousselet.  
*Synchæta littoralis* Rousselet.  
*Synchæta longipes* Gosse.  
*Synchæta oblonga* Ehrenberg.  
*Synchæta pectinata* Ehrenberg.  
*Synchæta stylata* Wierzejski.  
*Synchæta tremula* (Müller).  
*Polyarthra euryptera* Wierzejski.  
*Polyarthra trigla* Ehrenberg=*Polyarthra platyptera* Ehrenberg.  
*Sphyrias lofuana* (Rousselet).  
*Plæsoma lenticulare* Herrick.  
*Plæsoma truncatum* (Levander).  
*Asplanchna brightwellii* Gosse.  
*Asplanchna herrickii* de Guerne.  
*Asplanchna intermedia* Hudson.  
*Asplanchna priodonta* Gosse.  
*Asplanchnopus multiceps* (Schrank).  
*Asplanchnopus hyalinus*, new species.  
*Harringia rousseleti* de Beauchamp.  
*Testudinella incisa* (Ternetz)=*Pterodina incisa* Ternetz.  
*Testudinella intermedia* (Anderson)=*Pterodina intermedia* Anderson.  
*Testudinella parva* (Ternetz)=*Pterodina parva* Ternetz=*Pterodina bidentata* Ternetz.  
*Testudinella patina* (Hermann)=*Pterodina patina* (Hermann).  
*Testudinella truncata* (Gosse)=*Pterodina truncata* Gosse.  
*Pedalia fennica* (Levander)=*Pedalion fennicum* Levander.  
*Pedalia mira* (Hudson)=*Pedalion mirum* Hudson.  
*Filinia cornuta* (Weisse)=*Triarthra breviseta* Gosse.  
*Filinia longiseta* (Ehrenberg)=*Triarthra longiseta* Ehrenberg.  
*Filinia passa* (Müller)=*Triarthra mystacina* Ehrenberg.

Order FLOSCULARIACEA.

- Floscularia conifera* (Hudson)=*Melicerta conifera* Hudson.  
*Floscularia melicerta* (Ehrenberg)=*Melicerta najas* (Ehrenberg).  
*Floscularia ringens* (Linnæus)=*Melicerta ringens* (Linnæus).  
*Limnias ceratophylli* Schrank.  
*Limnias melicerta* Weisse=*Limnias annulatus* Bailey.  
*Ptygura brachiata* (Hudson)=*Æcistes brachiatus* Hudson.  
*Ptygura crystallina* (Ehrenberg)=*Æcistes crystallinus* Ehrenberg.  
*Ptygura mucicola* (Kellicott)=*Æcistes mucicola* Kellicott.  
*Sinantherina socialis* (Linnæus)=*Megalotrocha alboflavicans* Ehrenberg.  
*Lacinularia flosculosa* (Müller)=*Lacinularia socialis* Ehrenberg.  
*Beauchampia crucigera* (Dutrochet)=*Cephalosiphon limnias* of Gosse, not Ehrenberg.  
*Conochilus hippocrepis* (Schrank)=*Conochilus volvox* Ehrenberg.  
*Conochilus unicoloris* Rousselet.  
*Conochiloides dossuarius* (Hudson).

Order COLLOTHECACEA.

- Collothea ambigua* (Hudson)=*Floscularia ambigua* Hudson.  
 ?*Collothea annulata* (Hood)=*Floscularia annulata* Hood.  
*Collothea campanulata* (Dobie)=*Floscularia campanulata* Dobie.  
*Collothea cornuta* (Dobie)=*Floscularia cornuta* Dobie.

- Collotheca coronetta* (Cubitt)=*Floscularia coronetta* Cubitt.  
*Collotheca cyclops* (Cubitt)=*Floscularia cyclops* Cubitt.  
*Collotheca mira* (Hudson)=*Floscularia mira* Hudson.  
*Collotheca mutabilis* (Hudson)=*Floscularia mutabilis* Hudson.  
*Collotheca ornata* (Ehrenberg)=*Floscularia ornata* Ehrenberg.  
*Collotheca pelagica* (Rousselet)=*Floscularia pelagica* Rousselet.  
*Collotheca tenuilobata* (Anderson)=*Floscularia tenuilobata* Anderson.  
*Stephanoceros fimbriatus* (Goldfuss).  
*Cupelopagis vorax* (Leidy)=*Apsilus vorax* (Leidy).  
*Acyclus inquietus* Leidy.

## Order BDELLOIDA.

- Adineta gracilis* Janson.  
*Adineta vaga* (Davis) (form *major*).  
*Philodina acuticornis* Murray.  
*Philodina citrina* Ehrenberg.  
*Philodina megalotrocha* Ehrenberg.  
*Philodina plena* (Bryce).  
*Rotaria citrina* (Ehrenberg)=*Rotifer citrinus* Ehrenberg.  
*Rotaria elongata* (Weber)=*Rotifer elongatus* Weber.  
*Rotaria macroceros* (Gosse)=*Rotifer macroceros* Gosse.  
*Rotaria macrura* (Ehrenberg)=*Rotifer macrurus* Ehrenberg.  
*Rotaria neptunia* (Ehrenberg)=*Actinurus neptunius* Ehrenberg.  
*Rotaria rotatoria* (Pallas)=*Rotifer vulgaris* Schrank.  
*Rotaria sordida* (Western)=*Callidina sordida* Western.  
*Rotaria tardigrada* (Ehrenberg)=*Rotifer tardus* Ehrenberg.  
*Macrotrachela aculeata* Milne.  
*Macrotrachela crucicornis* (Murray)=*Callidina crucicornis* Murray.  
*Macrotrachela habita* (Bryce)=*Callidina habita* Bryce.  
*Macrotrachela multispinosa* Thompson.  
*Macrotrachela muscosa* Milne.  
*Macrotrachela nana* (Bryce)=*Callidina nana* Bryce.  
*Macrotrachela papillosa* Thompson.  
*Macrotrachela plicata* (Bryce)=*Callidina plicata* Bryce.  
*Macrotrachela quadricornifera* Milne.  
*Dissotrocha aculeata* (Ehrenberg).  
*Dissotrocha macrostyla* (Ehrenberg).  
*Mniobia russeola* (Zelinka).  
*Habrotrocha angusticollis* (Murray).  
*Habrotrocha annulata* (Murray).  
*Habrotrocha auriculata* Murray.  
*Habrotrocha constricta* (Dujardin).  
*Habrotrocha lata* (Bryce).  
*Habrotrocha pusilla* (Bryce).  
*Scepanotrocha rubra* Bryce.

## NOTOMMATA PACHYURA (Gosse).

- Copeus pachyurus* GOSSE, Hudson and Gosse, *Rotifera*, 1886, vol. 2, p. 31, pl. 16, fig. 4.  
*Copeus triangulatus* KIRKMAN, *Journ. Royal Micr. Soc.*, 1906, p. 264, pl. 12, figs. 10, 11.  
*Notommata pachyura* HARRING, *Bull. 81 U. S. Nat. Mus.*, 1913, p. 79.

This species occurs here nearly the entire year; as all intermediate stages may be found between the humpless and the three-humped

form, there can be no doubt about their specific identity. The first explanation of the variation that suggested itself was the Ostwald "viscosity-adaptation" theory; the temporal distribution appeared, however, to contradict any simple temperature effect as the probable cause. To test this a record of the temperature of the water was taken weekly for a year, with notes on the occurrence of the two forms.

Beginning in January, the humpless form appeared first; the intermediate and fully humped forms did not appear until the latter part of June, when the temperature was 26.5° C. The humpless form continued to occur, although in reduced numbers, throughout the summer. The humped form was far more abundant and persisted until the beginning of November, when the temperature had dropped to 6.5° C. This would seem to exclude any direct temperature effect as the controlling factor. It is highly probable that the key to these and similar variations has been supplied by the work of Powers on *Asplanchna*, and that a change of food organisms is the cause.

ROUSSELETIA, new genus.

ROUSSELETIA CORNICULATA, new species.

Plate 37, figs. 1-3.

The body of this small species is fairly stout, gibbous dorsally, with a slight constriction separating the head from the posterior portion. A well-marked tail projects over the foot, which is rather long; at its termination a single long dorsal seta is occasionally present, but generally it is broken off. The two short, conical toes occupy only the ventral half of the foot joint.

The corona is nearly terminal and has a well-developed circum-apical band without any dorsal gap. From the unciliated apical plate project two conspicuous, slightly decurved papillæ, resembling those of the genus *Plasoma*. The buccal field is semicircular and evenly ciliated, with the mouth near the ventral edge.

The ganglion is large, with an eyespot at its posterior termination. The elongate-pyriform retrocerebral sac is filled with highly refractive granules, even in the two anterior branches of the duct.

The mastax is of huge proportions, equaling fully half the length of the body proper. The short esophagus leads to a large stomach without separate intestine; the gastric glands are small and difficult to find. In full grown individuals the stomach extends forward as a blind pocket on each side of the mastax. The entire animal is colored an almost opaque green, due to the presence of symbiotic Zoochlorellæ. The ovary is normal and the contractile vesicle rather small. The two foot glands are club-shaped and of moderate length.

The mastax is of the virgate or "pumping" type and highly specialized, the mallei being reduced to very slender, unjointed and strongly curved rods, a short spur projecting downward near the

middle; the fulcrum is large, its lower end broadly fan-shaped and in the transverse plane, so far as known the only instance of its kind. The rami consist of a network of ribs, roughly semicylindrical in shape; each ramus is pierced by two large holes. A rod-shaped epipharynx with decurved ends assists in supporting the oral region.

Total length 130  $\mu$ ; trophi, 42  $\mu$ .

*Type*.—Cat. No. 16516, U.S.N.M., was collected at Kenilworth, District of Columbia, where the species occurs in fair numbers among the weeds in shallow ponds throughout the greater part of the year.

That this species belongs to the Notommatidæ is evident; the corona is of a frequently recurring type and not far removed from that of the genus *Diaschiza*. The frontal papillæ, while very characteristic, are probably of small systematic importance, as they are found in widely varying degrees of development in otherwise closely related species. The mastax is, however, of such an unusual type, that it seems advisable to make this species the type of a new genus. It has been named for Mr. Charles F. Rousselet, of London, to whom every student of the Rotatoria, including the writer, is indebted for generous assistance and advice.

ENCENTRUM APER, new species.

Plate 34, figs. 7-10.

The body is slender and nearly cylindric, passing rather abruptly into a short foot. While the integument is very flexible and without any indication of any segmentation when the animal swims, some inconspicuous transverse folds appear when it is crawling about in search of food. One fold is immediately behind the auricles, a second separates the head from the body, and a third marks off a short posterior segment. The foot is short and considerably smaller than the last segment of the body; the anterior portion of the toes tapers gradually to a fine, slightly decurved point.

The corona is almost ventral; the auricles are not very prominent. At the base of the moderate-sized anterior hook or ligula, in front of the auricles, there is on each side a slight emargination for the insertion of a "tusk," or tooth-like projection. The purpose of this structure is unknown; nothing similar is to be found among the related species available for comparison. It is not a mere flap of the integument, but a well-defined, bluntly conical tooth of high refractive index, which demonstrates its abrupt termination at the point of insertion; there is no suggestion of a gradual transition to the normal structure of the integument. Immediately behind this "tusk" a tuft of very long and stout, immobile sensory setæ project laterally and somewhat posteriorly.

The ganglion is large; a small retrocerebral sac is present, but no subcerebral glands. While no eyespots are visible in the living or



preserved specimens, two faintly orange-colored globules appear behind the auricles when the tissues are dissolved in potassium hypochlorite; no doubt these are identical with the eyespots of other members of the genus.

The contractile vesicle and ovary are normal; the foot-glands are large and lead by a narrow duct to a mucus reservoir at the base of the toes.

The trophi are forcipate and slightly asymmetric. The fulcrum is a thin triangular plate; the rami are stout, with rather blunt points; on their ventral side well-developed alulæ serve for the attachment of the abductor muscles. The right uncus has two teeth, which form a fork, embracing the ramus; the left uncus is a flat triangular plate, reinforced by ribs and resting on a flattened portion of the ramus. The manubria are also slightly dissimilar, the left one being the more strongly developed and a little posterior with respect to the position of the right manubrium.

Total length, 240  $\mu$ ; toes, 33  $\mu$ ; trophi, 37  $\mu$ .

*Type*.—Cat. No. 16517, U.S.N.M., was collected at Kenilworth, District of Columbia, in a weedy pond among branches of *Myriophyllum* in incipient decay.

This species appears to be the one described by Gosse<sup>1</sup> as *Diglena caudata* Ehrenberg. A comparison of Ehrenberg's figure and description in *Die Infusionsthierchen* with Gosse's *Diglena biraphis* shows, however, that these are beyond doubt identical, so that a new name is necessary for the misdetermined animal.

#### ENCENTRUM MYRIOPHYLLI, new species.

Plate 34, figs. 1-3.

The body is moderately stout and slightly gibbous dorsally; a large frontal ligula overarches the corona. Posteriorly the body tapers gradually to the short foot; the toes are very slightly decurved and end in fine points.

The corona is very oblique, and has prominent auricles. The ganglion is rather small; the retrocerebral sac is pyriform and reaches to the stomach. At the base of the ligula are two moderately large eyespots.

The forcipate trophi are notable for the reduction of the mallei; the incus, on the contrary, is unusually powerful. The fulcrum is a rather short, broad, and thin plate, rounded posteriorly; the rami are very large at the base and taper to stout, incurved points. The manubria are long, very slender, round rods with a double curve in the dorso-ventral plane; the unci, as usual in this type of mastax-have but a single tooth, which is also long and slender; the needle,

<sup>1</sup> *The Rotifera*, vol. 2, p. 51.

like point is slightly incurved and no doubt immovably united to the rami.

The stomach is without separate intestine; the ovary, contractile vesicle, and foot-glands are normal.

Total length, 160  $\mu$ ; toes, 26  $\mu$ ; trophi, 24  $\mu$ .

*Type*.—Cat. No. 16518, U.S.N.M., comes from Kenilworth, District of Columbia, where the species occurs in small numbers among the branches of *Myriophyllum*.

ENCENTRUM RICCIÆ, new species.

Plate 34, figs. 4-6.

The body tapers gradually toward the foot, which is short and sharply marked off, with a tail projecting over it dorsally; a prominent triangular ligula overarches the corona. The toes are cylindrical and of the same diameter throughout their length, straight at the base, and strongly decurved posteriorly; the ends are rounded.

The oblique corona has two fairly prominent auricles at the base of the ligula. The ganglion is moderate-sized and closely overlaid by the rather small retrocerebral sac; no subcerebral glands have been found, nor are any eyespots present.

The hexagonal cells of the stomach are conspicuous; the functions of an intestine are apparently performed by the posterior third of the stomach, although not separated from it by any constriction; its walls do not show the cell divisions. Ovary and contractile vesicle are normal, the foot-glands fairly long and nearly cylindrical.

The trophi are forcipate and, while not aberrant, are quite characteristic. The inner edges of the rami are nearly semicircular; a long, curved, needlelike tooth passes abruptly into the irregularly triangular posterior section. The fulcrum is rodlike, its extreme end slightly recurved. The manubria are strongly curved, their upper ends forked, embracing the exterior edges of the rami; the unci are divided into an uncus proper and a long, curved tooth. A relatively considerable space separates the unci from the manubria and their original relation has been completely lost, the unci acting merely as a second tooth to the rami, to which they are immovably united by muscular bands, at the base of the tooth further reinforced by a small V-shaped member, resting with one branch on the ramus, the other on the tooth. The manubriæ have become simple auxiliaries to the rami; their form makes it obvious that the adductor muscles of the rami are attached to them, thereby effecting the closing movement, the crutch of the manubria being united to the triangular alulæ by flexible ligaments.

Total length, 190  $\mu$ ; toes, 22  $\mu$ ; trophi, 31  $\mu$ .

This species was found in the fall among clumps of *Riccia fluitans* in ponds at Kenilworth, District of Columbia. Apparently it does not

swim unless absolutely compelled to do so, clinging with the greatest tenacity to the diatom-covering so abundant on this plant. It is most difficult to isolate, partly on account of its extreme hyalinity; as soon as disturbed it immediately wriggles back into the mud, and the search has to begin all over again. It has not been possible to preserve it in anything resembling its normal form.

DIGLENA CLASTOPIS Gosse.

Plate 34, figs. 11-13.

For some time this species was in doubt; the animal found here does not have the remarkably long-stalked subcerebral glands figured by de Beauchamp<sup>1</sup> and the slender, L-shaped epipharyngeal rods are not shown in his figure of the trophi.<sup>2</sup> De Beauchamp was good enough to send me some material for comparison, which demonstrated that the two animals are alike in all respects, except that the specimens from France have the subcerebral glands, readily seen even in preserved material, while in the local form they are totally absent. An exactly parallel case is cited by de Beauchamp (p. 158): Specimens of *Dicranophorus* (= *Eosphora*) *auritus* (Ehrenberg), collected near Bourg (Ain), have long subcerebral glands, while others from near Paris have extremely short glands. It seems possible that each of these two species may eventually prove divisible into two valid subspecies; however, the discovery, or at least the recognition, of the retrocerebral organ by de Beauchamp is of comparatively recent date and no information is as yet available concerning the extent of its possible variation, so that it seems preferable to consider these forms provisionally as belonging to a single species.

LECANÉ STICHÆA, new species.

Plate 35, figs. 4-6.

In complete retraction the dorsal plate of the lorica is ovate; the frontal edge curves slightly forward. For two-thirds of its length the ventral plate is nearly parallel-sided, the posterior end being rounded; it projects considerably beyond the dorsal plate and very slightly over the movable foot joint. At the anterior edge of the lorica there are two conspicuous lateral points. The lateral sulci are of moderate depth. Both dorsal and ventral plate are faceted as shown in the figure.

The first foot joint is hardly distinguishable, the second, or movable, joint is comparatively large and stout, somewhat enlarged posteriorly and has a broadly heart-shaped emargination in front. The toes are a little less than half the length of the dorsal plate; in dorsal view they are parallel-sided, in lateral view they taper notice-

<sup>1</sup> Arch. Zool. Exp., ser. 4, vol. 10, p. 157, fig. XII F.

<sup>2</sup> P. 227, fig. XXXV B.

ably for one-fourth of their length, then increase slightly in width, only to be again reduced in the posterior fourth. The claw is of moderate size.

The dorsal plate is in retraction less gibbous than in the majority of species of this genus.

Total length 143  $\mu$ ; length of dorsal plate 90  $\mu$ , width 75  $\mu$ ; length of ventral plate 103  $\mu$ , width 58  $\mu$ ; toes 32  $\mu$ , claw 7  $\mu$ ; width of anterior points 62  $\mu$ ; tail projects beyond dorsal plate 13  $\mu$ .

The description and measurements refer throughout to fully contracted specimens.

*Type*.—Cat. No. 16519, U.S.N.M., is from Glenburnie, Maryland, where the species is abundant in *Sphagnum*.

MONOSTYLA ACUS, new species.

Plate 36, figs. 1-3.

In complete retraction the dorsal plate of the lorica is subcircular, with an anterior sinus of moderate depth, the sides of which form nearly straight lines. The ventral plate is oval and slightly narrower than the dorsal; the anterior sinus is of the same form as that of the dorsal plate and projects very slightly beyond it. The ventral plate extends over the foot, beyond the dorsal plate, as a broad shield or tail. The lateral sulci are deep, the posterior sulcus moderately so. The lorica is without any markings.

The first foot joint is rounded anteriorly and is, as usual in the genus, immovable; the second foot joint is heart-shaped posteriorly and squarely truncate in front. The toe is approximately four-fifths as long as the entire body, very slender and slightly decurved at the base; the claw is very long. There are three annular constrictions of the mucus duct, the posterior annulus being about as far from the end of the toe as the length of the claw, the second an equal distance forward of the posterior, and the third about one and a half times the length of the claw removed from the second.

The dorsal plate is strongly gibbous posteriorly; the anterior portion of the ventral plate bends downward in the center, as does also the dorsal plate, so that they are in contact, and in a frontal view, if such were obtainable, they would appear as a very broad V, of nearly the same outline as the anterior margin in dorsal view.

Total length 180  $\mu$ ; length of dorsal plate 85  $\mu$ , width 82  $\mu$ ; depth of frontal sinus 10  $\mu$ ; tail projects beyond dorsal plate 15  $\mu$ ; length of ventral plate 100  $\mu$ , width 72  $\mu$ ; distance between inner edges of lateral sulci 53  $\mu$ ; length of toe 64  $\mu$ , of claw 12  $\mu$ ; greatest depth of body 38  $\mu$ .

*Type*.—Cat. No. 16520, U.S.N.M., comes from Glenburnie, Maryland, where the species is common in *Sphagnum*, growing in swampy parts of the woods.

## MONOSTYLA CRENATA, new species,

Plate 36, figs. 4-6.

In complete retraction the dorsal plate of the lorica is subovate, the anterior margin being almost straight. The ventral plate is oval, slightly narrower than the dorsal and projects but very little beyond it posteriorly; the anterior sinus is deep, rounded at the bottom and has strongly curved sides. The lateral sulci are deep, but narrow, the edges of the dorsal and ventral plate being nearly in contact their entire length. The posterior sulcus is of moderate depth. The lorica is not faceted.

The second foot-joint is slightly heart-shaped, excised in front, where it articulates with the rigid first joint, which is oval in outline. The toe is nearly three-fourths as long as the body, moderately stout and slightly decurved at the base; the claw is very small. The mucus duct is without constrictions.

The ventral plate is markedly convex and the dorsal very strongly so; owing to this, as well as the difference in outline, a considerable opening remains between the two plates of the lorica, when the head is completely retracted.

Total length, 190  $\mu$ ; length of dorsal plate, 108  $\mu$ , width, 88  $\mu$ ; length of ventral plate, 118  $\mu$ , width, 80  $\mu$ ; depth of ventral sinus, 20  $\mu$ ; distance between inner edges of lateral sulci at their widest point, 68  $\mu$ , at narrowest (posterior), 42  $\mu$ ; length of toe, 72  $\mu$ , of claw, 8  $\mu$ ; greatest depth of body, 60  $\mu$ .

*Type*.—Cat. No. 16521, U.S.N.M., is from Kenilworth, District of Columbia; the animal is locally the most abundant species of the genus, and seems to be widely distributed; it is common in collections from the Bureau of Fisheries station at San Marcos, Texas, and also in the collections of the Panama Biological Survey. Mr. James Murray informs me that he finds it in Australasia.

## MONOSTYLA SYLVATICA, new species.

Plate 35, figs. 1-3.

In complete retraction the dorsal plate of the lorica is nearly circular and has a shallow, rounded anterior sinus. The ventral plate is ovate and but four-fifths the width of the dorsal; the anterior sinus is of moderate depth, rounded at the bottom and with nearly straight sides. The lateral sulci are completely obliterated in contracted specimens, so that the dorsal and ventral plates appear to be joined by flat plates. The posterior sulcus is shallow. The lorica is without either dorsal or ventral markings.

The first, immovable, foot joint is oval, the second heart-shaped; the slightly decurved toe is about half the length of the body and has a small claw.

The dorsal plate is strongly gibbous posteriorly, and the depth of the body is almost half the length of the lorica. The anterior edges of the ventral plate curve upward.

Total length, 152  $\mu$ ; length of dorsal plate, 96  $\mu$ , width, 100  $\mu$ ; length of ventral plate, 100  $\mu$ , width, 82  $\mu$ ; width of anterior points of dorsal plate, 32  $\mu$ , of ventral plate, 53  $\mu$ ; length of toe without claw, 44  $\mu$ , claw, 8  $\mu$ ; depth of body, 48  $\mu$ .

*Type*.—Cat. No. 16522, U.S.N.M., was collected among submerged mosses growing on rocks in a small stream near the Bureau of Standards.

TRICHOTRIA BREVIDACTYLA, new species.

Plate 38, fig. 2.

The body of this species is slightly gibbous dorsally and obscurely faceted; the entire surface of the lorica is stippled. The last segment of the body is very broad at the base and tapers rapidly to the foot, so that in dorsal view it appears triangular; on its dorsal side it has a deep depression. The foot has two joints, the anterior one large and conical, the posterior small and cylindrical. The toes are blade-shaped and of moderate length; their upper and lower edges are straight and parallel, the point being formed by a downward curve of the upper edge. In other respects the animal agrees with *Trichotria pocillum*, *T. tetractis*, and *T. similis*.

Length, 340  $\mu$ ; toes, 48  $\mu$ .

*Type*.—Cat. No. 16523, U.S.N.M.

Two specimens only of this species were collected in the Potomac River.

DIURELLA PORCELLUS (Gosse).

Plate 38, fig. 1.

A *Diurella* agreeing in all respects with *D. porcellus* (Gosse), except in having a very high ridge extending the entire length of the body, occurs occasionally in the ponds at Kenilworth. It is uncertain whether this should be considered a case of dimorphism or whether we are dealing with two species; as an exactly parallel case occurs in the closely related genus *Trichocerca* (= *Rattulus*), it appears inadvisable to give any systematic name to this form, until more is known about the limits of variation in the family.

I am indebted to Mr. F. R. Dixon-Nuttall, of Eccleston Park, England, for the figure of this form.

SPHYRIAS LOFUANA (Rousselet).

Plate 37, figs. 4-8.

*Notops lofuana* ROUSSELET, Proc. Zool. Soc. London, 1910, p. 795, pl. 75, figs. 1-3.

*Sphyrias lofuana* HARRING, Bull. 81, U. S. Nat. Mus., 1913, p. 96.

This species was described by Rousselet from a single specimen found in a plankton collection from the Lofu River, a tributary of

Lake Tanganyika, Central Africa. As no living material was available it is but natural that the description is not as full as might be desired, and some additional notes may be of interest.

The body of this species is rather short and stout; the head is roughly triangular in outline with two large, short, lateral projections bearing suboval ciliated lobes. A marked constriction divides the head from the body, which is marked dorsally with strong longitudinal folds, gradually disappearing on the sides. The foot is long and wrinkled, but not jointed, slightly tapering and has a projecting skin-fold or tail at its base. The moderately large toes are straight on their inner edges, curved on the outer.

The tubular dorsal antenna is on the posterior part of the body, immediately behind the constriction, and is joined to the integument in its entire length; the lateral antennæ, small setigerous pimples, are situated just above the foot. The two eyespots are on the ciliated lobes, near their upper edges. The mouth is an oval slit with its long axis in the median plane; at the sides are two short papillæ tipped with sensory setæ.

The mastax is of the virgate type; the fulcrum is long and straight, formed of two plates joined together at the edges, so that their cross-section is V-shaped, with the apex dorsally. The rami are roughly triangular, with numerous pointed teeth on their inner edges; while quite formidable looking, it is doubtful whether these teeth play any part in subdividing the food; more probably they act as a sort of strainer for the "pump." The manubria are long and slightly incurved; the unci have one large, nearly straight, tooth, and at their bases two rudimentary teeth joined together by a thin plate. Two straight rods, expanded at their dorsal ends into triangular plates, pass dorso-ventrally across the mastax; at the ventral ends they are joined to the rami by muscular bands, the plate-like ends being embedded in the dorsal wall of the mastax. As will be seen from the ventral and frontal views of the trophi, these rods are not connected to the manubria, nevertheless they follow these in their longitudinal movements, acting apparently as a hinge. This appearance is caused by their attachment to the dorsal wall of the mastax, which naturally moves with the mallei. That these rods are of an epipharyngeal nature is highly probable; their attachment to the rami is, however, without a parallel among other Rotatoria. The "pumping" action of the virgate mastax can be seen very clearly in this species on account of the transparency of the head. The rest of the alimentary tract calls for few remarks; two elongate, club-shaped mastax glands are in the usual position; the short esophagus leads to the globose stomach, which is without separate intestine; the left gastric gland is immediately behind the mastax, while the right one is crowded

back by the ribbon-shaped ovary. The contractile vesicle is normal; the excretory canals have each five flame-cells.

The ganglion is a large triangular mass lying over the mastax and extends nearly the entire width of the head. At the posterior angle a granular, opaque deposit is usually found; this is no doubt the retrocerebral sac, although it can not be stained *intra-vitam*.

At the point of attachment of the four dorsal longitudinal muscles small tufts of sensory setæ are present. The animal is carnivorous; its food seems to consist principally of the smaller Bdelloids and *Gonochilus*, whose trophi are often found in its stomach. When swimming, the frontal part of the head is withdrawn and puckered up, so that the animal appears squarely truncate in front.

As this species does not have any close relatives among known genera of Rotatoria, it has been made the type of a new genus; its affinities seem to be with *Synchæta* and *Plasoma*, but it is a parallel, rather than an intermediate, branch of the Ploima.

Total length, 320  $\mu$ ; trophi, 62  $\mu$ .

*Sphyrias lofuana* inhabits weedy ponds; it was first found in the old Fish Ponds, now filled in, and a few specimens occurred in the swamps at Four Mile Run; it is not uncommon in the ponds at Kenilworth. From the list of species accompanying the original description it is evident that its presence in the Lofu River is adventitious; all the species are pond forms and not one of the 22 is normally a river planktont.

ASPLANCHNOPUS HYALINUS, new species.

Plate 38, figs. 3 and 4.

The body of this species is moderately elongate, the posterior, globose portion being separated from the head by a very slight constriction or neck. The foot is nearly one-third as long as the body and jointed, the terminal joint being about twice as long as the basal. The toes are somewhat blade-shaped and approximately the same length as the first foot-joint; the mucus glands are as long as the entire foot.

The corona is terminal and of the usual *Asplanchna*-type; a circumapical band interrupted ventrally at the mouth and laterally by two small papillæ bearing red pigment-spots. The ciliation of the buccal field is limited to a line of short cilia on each side of the mouth, passing from there transversely to the two lateral papillæ. The dorsal antennæ are not far posterior to the corona; there are two distinct tufts of setæ, united internally by the usual muscle; two nerve-threads pass to the ganglion. The lateral antennæ are in the usual position. The ganglion has a prominent eyespot at its posterior end. The retrocerebral sac is well developed, as well as the subcerebral glands, these being about half as long as the sac.



The voluminous mastax incloses the incudate trophi, which are notable for the simplicity of their structure; they are without any inner teeth, reinforcing ribs or other complexities found in the majority of the species of this family.

From the mastax a very short œsophagus leads to the large stomach, which is divided by a slight constriction, the anterior portion showing the same characteristic muscular network as the walls of the mastax. The posterior section is thick-walled, with large cells for absorption of the products of digestion. Two rounded gastric glands open into the anterior portion of the stomach immediately behind the entrance of the esophagus.

The lateral canals, with eight flame cells each, lead to the moderate-sized contractile vesicle. The ovary is ribbon-shaped; as far as known, the animal is oviparous, at least nothing has been observed that would indicate the contrary.

Total length, 520  $\mu$ ; length of body, 395  $\mu$ ; greatest depth, 255  $\mu$ ; length of foot without toes, 90  $\mu$ ; toes, 36  $\mu$ ; length of trophi, 70  $\mu$ ; width, 48  $\mu$ .

*Type*.—Cat. No. 16524, U.S.N.M.

This species is interesting in that it seems to retain more of the primitive organization than any other known species of the family. While the trophi are as highly specialized as any, the stomach shows unmistakable evidence of the transition from the *Notommata*-type, where the principal part of the digestion takes place in the anterior section, to the usual *Asplanchna*-type, where this has become indistinguishable from the esophagus and virtually forms part of it. The dorsal antennæ are in nearly the same position as that of *Notommata*, but still retain the characteristic features of *Asplanchnidæ*; under sufficient magnification they are seen to be distinctly double, the two setigerous pits being about 8  $\mu$  apart. The well-developed, even though small, retrocerebral organ, the conspicuous foot and the small number of flame cells are all nearer the primitive type than in other members of the family. The animal is excessively transparent, and in its habits, as well as general appearance, resembles far more the *Notommatidæ* than its congener, the predacious and powerful *Asplanchnopus multiceps* (Schrank).

A few specimens of this species were found in the middle of August, 1911, on tide-swept flats at Four-Mile Run, near Washington. They occurred only at a certain stage of the outgoing tide, which seems to indicate that they came from the swampy region above the place where they were actually found. It has not been seen since.

#### TESTUDINELLA PARVA (Ternetz).

*Pterodina parva* TERNETZ, Rot. Umg. Basels, 1892, pp. 20, 42, pl. 3, figs. 21, 22.

*Pterodina bidentata* TERNETZ, Rot. Umg. Basels, 1892, pp. 20, 44, pl. 3, fig. 23.

*Pterodina emarginata* WIERZEJSKI, Bull. Acad. Sci. Cracovie (for 1892) 1893, p. 407.

*Pterodina calcaris* LANGER, Verh. Ver. Nat.- u. Heilkde., Pressburg, n. ser., vol. 19, 1909, p. 46, fig. 3.

*Testudinella bidentata* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 100.

*Testudinella parva* HARRING, Bull. 81 U. S. Nat. Mus., 1913, p. 100.

In recent collections from Kenilworth this species has occurred in considerable numbers, and in all stages from the form with well-developed posterior teeth on the edge of the lorica to the toothless form, including specimens with the tooth present on one side and absent on the other. As one name must be dropped, and *parva* has page priority, apart from its being rather more suitable, it seems best to retain this as the specific name.

#### EXPLANATION OF PLATES.

All the figures are highly magnified; for actual measurements see text.

##### PLATE 34.

- Fig. 1. *Encentrum myriophylli*, lateral view; page 395.  
 2. *Encentrum myriophylli*, trophi, ventral view.  
 3. *Encentrum myriophylli*, trophi, right lateral view.  
 4. *Encentrum ricciæ*, lateral view; page 396.  
 5. *Encentrum ricciæ*, trophi, ventral view.  
 6. *Encentrum ricciæ*, trophi, right lateral view.  
 7. *Encentrum aper*, lateral view; page 394.  
 8. *Encentrum aper*, dorsal view of head.  
 9. *Encentrum aper*, trophi, ventral view.  
 10. *Encentrum aper*, trophi, right lateral view.  
 11. *Diglena clastopis*, lateral view; page 397.  
 12. *Diglena clastopis*, trophi, ventral view.  
 13. *Diglena clastopis*, trophi, right lateral view.

##### PLATE 35.

- Fig. 1. *Monostyla sylvatica*, ventral view; page 399.  
 2. *Monostyla sylvatica*, dorsal view.  
 3. *Monostyla sylvatica*, lateral view.  
 4. *Lecane stichæa*, ventral view; page 397.  
 5. *Lecane stichæa*, lateral view.  
 6. *Lecane stichæa*, dorsal view.

##### PLATE 36.

- Fig. 1. *Monostyla acus*, ventral view; page 398.  
 2. *Monostyla acus*, lateral view.  
 3. *Monostyla acus*, dorsal view.  
 4. *Monostyla crenata*, ventral view; page 399.  
 5. *Monostyla crenata*, lateral view.  
 6. *Monostyla crenata*, dorsal view.

PLATE 37.

- Fig. 1. *Rousseletia corniculata*, lateral view; page 393.  
 2. *Rousseletia corniculata*, trophi, ventral view.  
 3. *Rousseletia corniculata*, trophi, left lateral view.  
 4. *Sphyrias lofuana*, lateral view; p. 400.  
 5. *Sphyrias lofuana*, dorsal view.  
 6. *Sphyrias lofuana*, trophi, left lateral view.  
 7. *Sphyrias lofuana*, trophi, oblique frontal view.  
 8. *Sphyrias lofuana*, trophi, ventral view.

PLATE 38.

- Fig. 1. *Diurella porcellus*, lateral view; page 400.  
 2. *Trichotria brevidactyla*, lateral view; page 400.  
 3. *Asplanchnopus hyalinus*, lateral view; page 402.  
 4. *Asplanchnopus hyalinus*, trophi, ventral view.